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§ 285. FRESH WATER ALGAE.

Synopsis of Discoveries and Researches in 1878.

The subjoined list is prepared on the plan of those I have heretofore presented. The species are arranged in accordance with the nomenclature of Dr. Rabenhorst, whose system I follow, not that it is wholly above criticism—no system is—but because it takes in the entire field, not merely sections, and is therefore more complete and comprehensive than any other.

Some of the plants described may prove to be only varieties, not distinct species, and some merely different forms or stages of plant-development, such as my own recent observations have satisfied me are of frequent occurrence; but these we will not discuss in the present paper, which is simply designed to record the plants found to correspond with species and varieties already described by European authors, and a few which, I believe, are quite new. The additions would have been comparatively few but for the invaluable aid of volunteers.

In early spring, Capt. J. Donnell Smith of Baltimore, Md., and Mr. C. F. Austin, of Closter, N. J., made a tour through Florida for the purpose of collecting cryptogams. Nearly two months were spent in this expedition and with very satisfactory results. On his way back, Capt. Smith stayed some time in South Carolina and in the Eastern part of Virginia, and, during the months of July and August, he extended his investigations into Western Maryland and West Virginia. Mr. H. W. Ravenel, of South Carolina, also went to Florida, and made collections, principally in the vicinity of Gainesville; later he explored the neighborhood of Darien, Ga. To Dr. Beardslee of Ohio, and to Dr. Hobbe of Iowa, I am also indebted for interesting specimens from the vicinity of their homes. Adding all of these gatherings to my own, I had nearly two thousand parcels to examine. As might have been expected, many were duplicates, and many similar to those heretofore noticed, but about 125 were new discoveries for the United States. These are noted in the following list.

The literature of Fresh Water Algae received some valuable additions during the year which it is proper to mention here. Dr. V. B. Wittrock and Mr. Otto Nordstedt, of Sweden, have issued a number of valuable memoirs; among these there is one by the former on "The Spore formation of the Mesocarpeae, and especially of the new genus *Gonatonema*"; and another on the development of systematic arrangement of *Pithophoraceae*, a new order of algae, which deserves a special notice. Dr. Wittrock found among some tropical algae a class which, in its general features, resembles the common *Cladophora*, but is distinguished from it by having many cells somewhat swollen, short, and rich in chlorophyll; these are most frequently alternated, in a regular manner, with the longer cylindrical cells. His attention was also drawn to this order of plants in the Lily house of the Botanical gardens at Kew, England, where the specimens he saw were supposed to have been introduced

with tropical phaenogamous plants. All of the forms hitherto found were from the East and West Indies, S. America and Australia. During the past year I identified two forms of this genus. The one from Florida, and the other from a pond in this immediate vicinity. The former agrees well with *P. Cleveana*, Wittr., a West India plant, the other is near *P. Oedogonia*, Mont. a French Guiana plant. I catalogue it as *P. Oedogonia*, var. *borealis*. The first specimens I found were sterile, without the swollen or barrel shaped cells. I recognized in it a new plant and called it "*Cladophora Vaucherioides*."

Mr. Otto Nordstedt has also published several interesting memoirs. The latest are "*De Algis aquae dulcis et de Characeis in insulis Sandvicensibus*" and his "*Botaniska Notiser*," Nov. 1878. In the latter he has a list of the American *Oedogonia* hitherto recognized by Dr. Wittrock.

A valuable contribution by Dr. O. Kirchner has recently appeared, entitled "*The Algae of Silesia*." It is taken from a larger work, now in the course of publication, called the *Cryptogamic Flora of Silesia*." The part published contains not only a descriptive list of the Algae of Silesia, but valuable information on the structure of plants, and a brief notice of researches made by others into the life history of Fresh Water Algae. It is a work that should be in the hands of all who pursue this study. FRANCIS WOLLE.

PHYCOCHROMOPHYCEAE.

Microcystis, Ktz.—*M. Donnellii*, n. sp. Thallo sordide luteoloolivascente; familiis globosis vel ovalibus, saepe plus minus angulosis, solidis, viridibus, sphaericis; cytoplasmate granuloso viridi. Diametro cellulis .00009"—.00016"; famil. 0015"—0035." Hab. in stagnis libere natans.

The forms recognized under *Microcysts* are not unfrequently earlier stages in the growth of some filamentous algae and this may be of that character. It was found in soft gelatinous masses, often nine and ten inches in diameter, floating in ponds; being unlike any described forms, I record it as above, hoping a further opportunity may be presented to study it more thoroughly. Collected in Garrett Co., Md., July, 1878, by J. Donnell Smith.

Hypheothrix, Ktz.—*H. aeruginosa*, Ktz. Forms a deep green stratum on wood at the artesian well, Charleston, S. C. Coll. J. D. Smith.—*H. tinctoria*, Rabenh. Parasitic on water plants.

H. tenax, n. sp.—*H. strato* late expanso, plus minus pulvinato, compacto, sordide olivaceo-viridi; trichomatibus initio laxe flexuoso-curvatis, deinde in membranam firmam vel pulvinatam dense intricatis, pallide aerugineis; articulis subaequalibus, saepius indistinctis, nonnumquam interruptis; vaginis arctis, achrois, subfirmis. Diametro cum vaginis .00014"—0002." Hab. in stagnis lapides fissiles occupans.

Oscillaria, Bosc.—*O. princeps*, Vauch.—*O. percursa*, Ktz.—*O. rufa* Ktz.—*O. chalybea*, Mertens. All from moist ground, Florida. Coll. J. D. Smith.

- Phormidium**, Ktz.—*P. Retzii*, Ktz.—*P. Naveanum*, Grun.—*P. subtorulosum*, Breb.—*P. fonticola*, Ktz.—*P. Julianum*, Rabenh. All from Florida. Coll. J. D. Smith.—*P. fasciculatum*, Naeg.—*P. Joannianum*, Ktz. Both from Suffern, N. Y. The first growing on Aulocomnium in a swamp; the other from old wood. Coll. C. F. Austin.—*P. rupestre*, Ag. Forms a matted stratum on rocks; Garrett Co., Md., Coll. J. D. Smith.
- Lyngbya**, Ag.—*L. aeruginosa*, Ag. In pools of moist earth subject to inundations from flowing tides, N. Jersey.—*L. major*, Ktz. St. Lucia river, Florida. Coll. J. D. Smith.
- Hydrocoleum**, Ktz.—*H. heterotrichum*, Ktz.—*H. Helveticum*, Naeg. In gelatinous strata on stones in marshy places.
- Symploca**, Ktz.—*S. fuscescens*, Ktz.—*S. terrestris*, Ktz. Wet ground and river banks.
- Nostoc**, Vauch.—*N. muscorum*, Ag. On *Grimmia*. Coll. T. S. Brandege, Colorado. A dubious species and genus.
- Nostochopsis**, Wood. Have plants from Florida that agree well with diagnosis. They are probably an undeveloped form of *Hapalosiphon*. Coll. J. D. Smith.
- Capsosira**, Ktz.—*C. Brebissonii*, Ktz. Intermingled with *Phormidium*. Florida. Coll. J. D. Smith.
- Mastigonema**, Swabe.—*M. Donnellii*, n. sp.—*M. caespitosum* in strato mucoso, olivaceo-viridi; filamentis saepius simplicibus, flagelliformibus, longissime productis, variis, modo tenuibus et flaccidis, modo validis et rigidis, diametro .00024"—.0005", ad basim saepe .0006"—.0008", nonnumquam pseudo-ramosis, leniter curvatis, dense intricatis; internis pallide vel pulchre aerugineis, vel fusciscentibus, saepe interruptis; distinctissime sed breviter articulatis; articulis diametro plerumque 4-5-plo brevioribus; arctissime vaginatis; vaginis achrois subtilissimis, in apice saepe filiiforme productis; adultis truncatis et apertis. Cellulis perdurantibus, globosis, compressis, basalibus et rarius interstitialibus. Hab. in lignis aqua maritima submersis.

This is a beautiful plant, but variable, and might under some of its transformations be classified with the *Leibleinia*, Endl, or *Desmarestella*, Bory, but the basal heterocysts of the perfect plants, the formation of spores in the swollen basal parts of the trichomas and the development of the plants from subspherical spores, all of which I found fully exemplified, connect it with the *Mastigonemas*. Filaments are sometimes thin and flaccid, but the bases are much swollen. Intermingled are others of twice the size. The articulations are composed of thin disks; these frequently separate into short sections, the disks of the ends of which incline towards each other, and thus form a sort of dark double concave division in the trichomas, such as are not unfrequently seen in the filaments of *Lyngbya*, *Tolypothrix*, etc.

M. velutinum, n. sp.—*M. strato plus minus expanso* ad duas lineas crasso, pulvinato, humectato molli-tomentoso, velutino, saturate olivaceo-viridi; trichomatibus subrectis vel

flexuoso-curvatis, simplicibus, laete aerugineis, nonnumquam luteo-fuscescentibus, distincte articulatis; articulis diametro 3-4vel 6-8plo brevioribus; vaginis arctis, initio cuspidatis clausis, adultis truncatis et apertis. Cellulis perdurantibus, subglobosis, pallido-luteolis, trichomatis diametro minoribus. Diam. trich. cum vaginis saepius .0005", rarius .0003"—.0006". Hab. in lignis madidis aquae maritimae.

A distinct and fine plant. I found it in an extended olive green stratum, a little above the water level, on the plank sides of a neglected basin of sea water, at Perth Amboy, N. J., July, 1878.

Schizosiphon, Ktz.—Sch. Cataractae, Naeg. Niagara Falls.—Sch. Meneghinianus, Ktz. In a gelatinous stratum on old, wet wood, Florida.—Sch. Bauerianum, Grun. Submerged wood, Florida; both collected by J. D. Smith.—Sch. crustiformis, Naeg. Wet rocks, Cannon City, Colorado. Coll. T. S. Brandegee.

Scytonema, Ag.—Sc. ambiguum, Palisades, N. J., C. F. Austin; and Gainesville, Florida, H. W. Ravenel. Frequent on moist rocks and on the ground.—Sc. truncicola, Rabenh. Old pine board, Aiken, S. C. Coll. H. W. Ravenel.—Sc. Hegetschweileri, Itz. Cannon City, Colorado. Coll. T. S. Brandegee.—Sc. turfosum, Ktz.—Sc. polymorphum, Ktz.—Sc. Notarisii, Menegh. These three from moist earth, Florida. Coll. J. D. Smith.—Sc. intertextum, Ktz. Old wood, Florida, J. D. Smith.

Sc. mirabile, n. sp.—Sc. strato plus minus expanso, olivaceo-fuscescente, vel viridescente; trichomatibus validis, flexuoso-curvatis, distincte articulatis; pseudo-ramulis numerosis, plerumque geminis et coalitis ad terminalia; articulis diametro duplo triplo brevioribus, saepe submoniliformibus, aerugineis. Vaginis trichomatum firmis, laevibus, olivaceo-luteis, vel rarius subachrois. Cellulis perdurantibus interjectis, singulis, subglobosis, luteis. Diam. trich. cum vag., .0008"—.001"; ramulor. .0005"—.0006". Hab. in Taxodii cortice. Florida. Coll. H. W. Ravenel.

The development of this plant was described under "A Nostoc the matrix of *Scytonema*" in the BULLETIN of April last.

Sc. cortex, Wood, var *corrugatum*, n. var. In the collections made by Mr. Ravenel in S. Carolina and Florida, and by Messrs. Smith and Austin in Florida, I found no less than thirty different specimens of a plant in almost as many forms and phases of growth. The number enabled me to make the plant a thorough study. Its development from cysts was well exemplified. Two forms are described by Dr. Wood; one as *Sc. cortex* and the other as *Sc. Ravenelii*. They are evidently the same plant; another, very distinct, and beautiful form, I call var. *corrugatum*, and another might be called var. "bruneum." The filaments of the former often measure .0007" to .00116". They are of a bright aeruginous color and are coated with a colorless gelatin; this in drying contracts irregularly, thereby

causing the filaments to appear crenate or corrugate. The other variety "bruneum" is dark brown. The filaments are covered with what appear to be subspherical resinous cells. This is probably an older form of the *corrugatum* variety. The term "cortex" is significant and should be retained; then *Ravenelii*, *corrugatum*, and possibly *bruneum* would be varieties. The other forms of this genus have their parts in accord with accepted descriptions, but I am by no means satisfied that all are distinct species. I accept the dicta of the fathers until a fuller light dawns.

Calothrix, Ag.—*C. mirabilis*. Ag. Falls of Deep Creek, Md. Coll. J. D. Smith.

Tolypothrix, Ktz.—*T. Ravenelii*, n. sp. T. in strato minus expanso, aureo-fusca, trichomatibus pseudoramulisque elongatis; internis flavo-rubrescentibus saepe interruptis, distincte articulatis, articulis gracillime granulosis, diametro subaequalibus vel duplo brevioribus; vaginis subarctis, luteo-fuscescentibus; cellulis perdurantibus basilaribus et interjectis, plerumque singulis, oblongis, luteolis. Diam. cum vaginis .0006"—.0008", rarius .001". Hab. in rupibus aquae dulci expositis.

This plant was found on sand stone rock, Gainesville, Fla., by Mr. Ravenel. It is nearest to *T. distorta*, but differs in size, in articulation, in the character of the heterocysts, and in habitat.

Hapalosiphon, Naeg.—*H. Braunii*, Naeg. Not infrequent in fresh and salt water, in limited quantity, from Pennsylvania to Florida.—*H. fuscescens*, Ktz. Dr. Rabenhorst remarks on this species, "ab antecedente vix diversus."

The plant I place here is more distinct; the articulations of the rhizoma are usually subequal and moniliform, and those of the branches one to two diameters in length. Frequent in pond at Pleasant Mills, N. J. Young forms of this genus may be readily reconciled with the characters of the genera *Mastigocladus*, Cohn, and *Nostochopsis*, Wood.

Sirosiphon, Ktz.—*S. ocellatus*, Ktz. not infrequent in wet and swampy places.

Much might be said of the propagation of plants of this genus. Space would not admit of it here.

CHLOROPHYLLOPHYCEAE.

Scenedesmus, Meyen —*S. antennatus*, Breb. Coll. J. D. Smith, Florida.

Characium, A. Braun —*C. strictum*, A. Br. Parasitic on filamentous plants.

DESMIDIACEAE.

Tetmemoras, Ralfe.—*T. granulatus*, Breb.—*T. Brebissonii*, Menegh. Florida, J. D. Smith.

Sphaerosma, Corda.—*S. serratum*, Bailey. Frequent in S. Carolina and Florida. Coll. H. W. Ravenel and J. D. Smith.—*S. filiformis*, Ehrb. Coll. H. W. Ravenel, Georgia.

- Bambusina**, Ktz.—*B. Brebissonii*, Ktz. Not a rare plant, but new in the various conditions of development. Pond, N. Jersey.
- Cosmarium**, Corda.—*C. commisurale*, Breb.—*C. Brebissonii*, Menegh.—*C. Cucurbita*, Breb.—*C. amoenum*, Breb. All from Florida. Coll. J. D. Smith.
- Euastrum**, Ehrb.—*E. spinosum*, Ralfs.—*E. humerosum*, Ralfs.—*E. pinnatum*, Ralfs.—*E. crassum*, Breb.—*E. insigne*, Hassall.—*E. Ralfsii*, Rabenh.—*E. abruptum*, var. *evolutum*, Nordstedt. All from ponds, Darien, Ga. Coll. H. W. Ravenel.
- Micrasterias**, Ag.—*M. rotata*, Ralfs.—*M. fimbriata*, Ralfs.—*M. ringens*, Bailey. Florida, J. D. Smith. *M. radiosa*, Ralfs.—*M. crenata*, Breb.—*M. arctuata*, Bailey. Ponds, N. Jersey.
- Staurostrum**, Meyen.—*St. tumidum*, Breb.—*St. Cerberus*, Bailey. Coll. J. D. Smith, Florida.
- Xanthidium**, Ehrb.—*X. cristatum*, Breb. Florida.—*X. armatum*, Breb. N. Jersey.

ZYGNEMACEAE.

- Spirogyra**, Link.—*Sp. fluviatilis*, Hilse.—*Sp. subsalsa*, Ktz. both from Florida. Coll. J. D. Smith.—*Sp. irregularis*, Naeg. Coll. Dr. Beardslee, Ohio.—*Sp. decimina*, Muller.—*Sp. protecta*, Wood.—*Sp. insignis*, Hassall.—*Sp. gracilis*, Hassall.—*Sp. stagnalis*, Hilse.—*Sp. intermedia*, Rabenh.
- Zygnema**, Ktz.—*Z. subtile*, Ktz. Darien, Ga. Coll. H. W. Ravenel, —*Z. tenue*, Ktz. Pleasant Mills, N. Jersey.
- Zygogonium**, Ktz.—*Z. conspicuum*, Ktz. Mountain springs, Pennsylvania and Maryland.—*Z. Agardhii*, Rabenh. Frequent in Florida. Coll. J. D. Smith.
- Mougeotia**, de By.—*M. laevis*, Archer. Coll. J. D. Smith, Florida.
- Sirogonium**, Ktz.—*S. strictum*, Ktz. Coll. J. D. Smith, Florida.
- Mesocarpus**, Hassall.—*M. parvulus*, Hass.—*M. intricatus*, Hass.—*M. robustus*, de By.—*M. radicans*, Ktz.
- Pleurocarpus**, A. Br.—*P. Columbianus*, n. sp. *P. libere natans*, caespitibus dense intricatis, sordide viridis; cellulis diametro .0016" (.0015"—.0017") 5-8 plo longioribus.
Hab. in stagnis, Bethlehem, Pa. This plant differs from the described forms in the thicker filaments and the longer articulations.
- Staurospermum**, Ktz.—*S. capucinum*, Ktz. Pleasant Mills, N. Jersey. A beautiful plant. The quadrangular spores and the filaments are considerably thicker than the measures indicated by Rabenhorst. They are more like the Swedish plant described by Wittrock under the same name.
- Vaucheria**, DC.—*V. sessilis*, DC.—*V. vesiculosa*, Ktz. At places flooded by marine waters. N. Jersey. A very distinct species. Dr. Rabenhorst questions the right of its place in this genus. The large, spherical, vesicular spores, are usually terminal on the branchlets, but occasionally also interstitial. Antheridia are not found. The general appearance and growth are *Vaucheria* like. For the present I retain the place chosen for the plant by Kützing.

Rhizoclonium, —Ktz. *Rh. fontinale*, Ktz., Mountain streamlets.—*Rh. tortuosum*, Ktz. Prince Edward Co., Va.—*Rh. fluitans*, Ktz. Garrett Co., Md. Latter two collected by J. D. Smith.—*Rh. salinum*, Schleich. Marine inlets, N. Jersey.—*Rh. hieroglyphicum*, var. *stagnale*, n. var. Near the typical form, but distinct in habitat. Found a large pond of stagnant water entirely covered with a thick floating stratum.

Rh. major, n. sp.—*Rh. strato saturate viridi*, trichomatibus dense intricatis, subrigidis, filis ramulos breves plerumque triquadropartitos numerose emittentibus; articulis diametro (.0013"—.02") subaequalibus, vel duplo longioribus; cytodermate crasso. Hab. in muris ligneis fluctibus illis.

This finely developed, large plant was found growing on the wooden piles of the docks at Perth Amboy, New Jersey, July, 1878. It is most like *Rh. pannosum*, Aresch, and may be a variety of it. It differs in size, in the character of the short branchlets and in habitat.

Cladophora, Ktz.—*Cl. fracta*, var. *gossipina*, Ktz.—*Cl. crispata*, var. *virescens*, Ktz. Both of these plants are common in ponds, etc.—*Cl. crispata*, var. *brachyclados*, Ktz. Sluggish waters, N. Jersey.—*Cl. vaucherioides*—see BULLETIN, page 187, November, 1877. Must be corrected to *Pithophora* *Oedogonia*, var. *borealis*, see explanation in the introduction.

Pithophora, Wittr.—*P. Oedogonia*, Mont. var. *borealis* n. var. abundant in pond, Bethlehem, Pa.—*P. Cleveana*, Wittr. Swampy ground, Florida. Coll. J. D. Smith, 1877 and 1878.

Oedogonium, Link.—*Oed. undulatum*, Breb.—*Oed. Boscii*, Breb.—*Oed. Braunii*, Ktz. The three collected at Darien, Ga., by H. W. Ravenel.—*Oed. stellatum*, Wittr. Florida, J. D. Smith.—*Oed. Lundense*, Wittr.—*Oed. Borisianum*, Wittr.—*Oed. varians*, Wittr. & Lund.—*Oed. paludosum*, Wittr.—*Oed. sexangulare*, Cleve.—*Oed. Upsaliense*, Wittr.—*Oed. platygynum*, Wittr.—*Oed. Hohenackerii*, Wittr.—*Oed. giganteum*, Ktz. These from various localities in New Jersey and Pennsylvania; the last one from Iowa. Coll. Dr. Hobbe.

Hormiscia, Aresch.—*H. implexa*, Ktz. Submarine soil, Florida, J. D. Smith.

Ulothrix, Ktz.—*U. radicans*, Ktz.—*U. crassiuscula*, Ktz. These two from Aiken, S. C. Coll. H. W. Ravenel.—*U. rivularis*, Ktz.—*U. parietina*, Ktz. Both from Florida, J. D. Smith.—*U. compacta*, Ktz. Small pool, N. Jersey.

Schizogonium, Ktz.—*Sch. thermale*, Menegh. Small mountain stream.

Chroolepus, Ag.—*Ch. abietinum*, Flotow. Florida, J. D. Smith.

Stegioclonium, Ktz.—*St. debile*, Ktz.—*St. uniforme*, Ag. Both from Florida. Coll. J. D. Smith.—*St. pusillum*, Ktz. On stones in streamlet.

Chantransia, Fries.—*Ch. Beardslei*, n. sp.—*Ch. caespitulis purpureo-roseis*, filis ramisque erecto-patentibus vel subadpressis; filamentis inferioribus diametro .001"—.002" et superioribus diametro .0006"—.0008", extremis obtusis; articulis diametro

ad sextuplo longioribus. Hab. in saxis fluvios juxta, Painesville, Ohio.

This plant was collected by a son of Dr. Beardslee from stones in rapid waters along with *Lemanea* and *Chantransia violacea*. It may possibly be a variety of the latter; if so it is a very extraordinary development, three to six times thicker than the typical form. It is nearer *Ch. amethystea*, Ktz. but differs in size, in the absence of enlarged ends of branchlets, and in equal length of cells throughout.

Hildenbrandtia, Nardo.—*H. rivularis*, Liebm. Exposed stones in Susquehanna River, Harrisburgh, Pa.

§ 286. **Distribution of Southern Plants.**—We have received from A. H. Curtiss, Jacksonville, Florida, a list of the plants in his first and second fascicles. We have before called attention to the excellent testimony to the completeness and excellence of these specimens, "well chosen, copious and perfect, carefully put up, all named, with printed tickets in neat form and taste, and cheap at the price, viz.: 20 dollars for 250 species." The fascicles will be forwarded by the Curator of Harvard University Herbarium upon receipt of the price. The postage on packages or freight to New York or Boston will be paid by Mr. Curtiss. He also offers selections of Southern or Northern plants (Mann's Catalogue or Curtiss' Check List) at \$10 a hundred; and likewise roots and seeds; so that a very rare opportunity is presented for obtaining Southern plants. In this connection, we would second Mr. Curtiss' recommendation of the typographical work of H. N. Patterson, Oquawka, Ill., who makes a specialty of labels, check lists, &c.

§ 287. **North American Musci.**—Mr. Eugene A. Rau, and the subscriber will issue on or before the first of May next, a "List of North American Musci." It will make an Octavo pamphlet of about 20 pages, and will be printed on good book paper. The Genera and Species, will be arranged in their natural order, with an "Index Generum" at the end. By this arrangement the list will serve the several purposes of a check and exchange list, a key to the natural order of the plants, and a guide to their classification in the herbarium. The geographical distribution of the species will be given. Orders are solicited at once, as but a limited number of copies will be printed. The money may accompany the order or may be sent on receipt of the list. Price postpaid, single copies 25 cts.; 5 copies \$1.00. Address, REV. A. B. HERVEY, Troy, N. Y.

§ 288. **New Zealand Ferns.**—We learn that Mr. G. W. Belfrage, Clifton, Bosque Co., Texas, has a fine collection of New Zealand Ferns for sale.

§ 289. **Rust Botanical Club.**—A few ladies of this city have formed a club, named the "Rust Botanical Club," of which Mrs. S. M. Rust has been elected President and Mrs. Charles Barnes Vice-President. At first we shall make the study of ferns our specialty, hoping afterward to study general botany. We wish to invite correspondence on either of these subjects, and hope to be able to furnish information regarding the flora of our County especially. Mrs. Rust has made a thorough study of them, and by her ex-